SECTION 15250

MECHANICAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation

B. Ductwork insulation

1.2 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01300:

1. Catalog data of insulation, jackets, covers, adhesives, coatings, and cements.

1.3 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84.

B. Provide insulation material 100% asbestos free.

1.4 QUALIFICATIONS

Installers: Company specializing in performing the work of this section with minimum of 3 years experience.

1.5 DEFINITION OF LOCATIONS

A. Finished and Unfinished Areas.

1. "Finished areas" are areas where floor, walls, ceilings, trim, or exposed steel are painted, tiled, or similarly finished.

2. "Unfinished areas" are areas with unpainted walls.

B. Exposed and concealed Areas

1. "Exposed areas" are finished areas and other areas used by personnel in the normal use of the building, such as fan rooms, mechanical rooms, and storage rooms.

2. "Concealed areas" are pipe tunnels, covered pipe trenches, spaces inside walls, duct or pipe shafts, spaces above dropped ceilings, unfinished attic spaces and crawl spaces.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original factory packaging, labeled with manufacturer's identification.

B. Store insulation in original wrapping and protect from weather and construction traffic.

C. Protect insulation against dirt, water, chemical, and mechanical damage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufactures of adhesive, mastic, and insulation cements.

B. Maintain temperature during installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 GENERAL

A. K-factors (thermal conductivity) shown are expressed in BTU· in/hr·ft^{2}·°F.

2.2 MANUFACTURERS

A. Owens/Corning Fiberglass, Armstrong Certainteed, Manville, Halstead, Rubatex, Childers.

B. For ease of identification and comparison, the products of one manufacturer for each application is specified.

2.3 FIBERGLASS PIPE INSULATION

A. Insulation: Rigid molded in compliance with ASTM C547, class 1, minimum density 3.5 pounds/cubic foot, K-factor of approximately 0.24 at 75 degrees F, suitable for temperatures from minus 20 degrees F to 450 degrees F.

B. Jacket: Factory applied vapor barrier all-service type with self-sealing lap and butt strips.

C. Valves and Fitting Covers: Pre-molded PVC covers with fiber glass insert.

D. Manufacturer: Certainteed 500 Snap-On.

2.4 ELASTOMERIC PIPE INSULATION

A. Insulation: Cellular closed cell in compliance with ASTM C534, Type 1, minimum density 5 pounds/cubic foot, K-factor of approximately 0.29 at 75 degrees F, suitable for temperatures up to 180 degrees F.

B. Valve and fitting covers: Same as pipe insulation, cut to fit.

C. Manufacturer: AP Armaflex

2.5 HYDROUS CALCIUM SILICATE PIPE INSULATION

A. Insulation: Rigid, in compliance with ASTM C533, Type 1, minimum density 13 pounds/cubic foot, K-factor of approximately 0.42 at 200 degrees F, suitable for temperature from 200 degrees F to 1200 degrees F.

B. Valve and Fitting Covers: Same as pipe insulation or "Quick Set" insulating cement.

C. Manufacturer: Owens/Corning Kaylo

2.6 GLASS FIBER BLANKET DUCT INSULATION

A. Insulation: Flexible blanket, in compliance with ASTM C612, minimum density 3/4 pounds/cubic foot, K-factor of approximately 0.29 at 75 degrees F, suitable for temperature from 35 degrees F to 250 degrees F.

B. Jacket: Factory applied Foil-Scrim-Kraft (FSK) facing.

C. Fittings: Same material as insulation.

D. Manufacture: Certainteed standard ductwrap.

2.7 GLASS FIBER BOARD DUCT INSULATION

A. Insulation: Rigid, in compliance with ASTM C612, Class 1, minimum density 3 pounds/cubic foot, K-factor approximately 0.23 at 75 degrees F, suitable for temperature from minus 20 degrees F to 450 degrees F.

B. Jacket: Factory applied Foil-Scrim-Kraft (FSK) facing.

C. Fitting: Same material as insulation.

D. Manufacturer: Certainteed 1B 300

2.8 METAL JACKETING - PIPING/DUCTWORK

A. Jacketing: Aluminum, .016 inches thick, embossed surface, with factory bonded moisture barrier.

B. Valve and Fitting Insulation Covers: Fabricate from same material as jacketing or use prefabricated insulation covers made in two matching halves.

C. Metal Jacketing Bands: 1/2 inch wide, aluminum or stainless.

D. Manufacturer: Childers

2.9 SADDLES (Piping/tubing up to 2 inches)

A. Use 180 degree saddle on systems utilizing teardrop type hangers.

B. Use 360 degree saddle on systems utilizing trapeze hangers or clamps.

C. Saddle: Galvanized steel, 14 gauge and 8 inches long.

2.10 INSERTS AND SHIELDS (Piping/tubing over 2 inches)

A. Use 360 degree calcium silicate insert with a 180 degree shield on systems utilizing clevis or teardrop type hangers.

B. Use 360 degree calcium silicate with a 360 degree shield on systems utilizing trapeze hangers or clamps.

C. The unit shall have an integral moisture barrier consisting of a tri-laminate All-Service Jacket equal and similar to the jacketing on the adjoining insulation.

D. Shield: Galvanized steel, length and gauge in accordance with insert and shield schedule.

E. Insert: Calcium silicate, minimum density 9 pounds/cubic foot, length in accordance with insert and shield schedule.

F. Insert and Shield Schedule

PIPE SIZE (INCHES)	2 TO 5	6 TO 10	12 TO 14	16 TO 24
INSERT LENGTH (INCHES)	6	9	12	18
SHIELD LENGTH (INCHES)	4	6	9	15
GAUGE OF STEEL SHIELD*	20 ga.	16 ga.	16 ga.	14 ga.

*Bottom shield only; top shield may be one gauge lighter.

G. Manufacturer: Value Engineered Products 1-800-921-1177.

1. Quick-Shield (clevis/teardrop type hangers).

2. Pro-Shield (trapeze type hangers).

3. Weathershield (outdoor installations).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that items to be insulated have been pressure tested and approved before applying insulation material.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION - GENERAL

A. Install materials in accordance with manufacturer's instructions.

B. Do not insulate factory insulated equipment.

C. Do not insulate nameplates.

D. Fit insulation tightly against surface to which it is applied.

E. Do not insulate flexible connections.

F. Continue insulation and vapor barrier through penetrations except where walls or floors are required to be firestopped or required to have a fire resistive rating.

3.3 INSTALLATION - PIPING

A. On exposed piping located in finished areas, locate cover seams in least visible area.

B. Provide continuous insulation through pipe hangers or supports.

C. Where insulation terminates, taper to pipe and finish with insulating cement or acrylic mastic.

D. Cover insulated pipes located outdoors or in tunnels with aluminum jacket with seams located at 3 o’clock of horizontal piping. Secure with aluminum straps, 16 inch centers.

E. Tape circumferential joints of pipe insulation with 3 inch wide white vinyl tape.

F. Do not insulate unions, flanges and valves in potable or non-potable piping system of 140

degrees F or less, except for chilled water.

G. Insulate fitting and valves where required with same material thickness as specified for adjacent pipe.

H. Insulate potable and non-potable cold water piping within walls, chases, or ceiling plenums where return air is present.

I. Insulate potable and non-potable cold water piping in equipment rooms.

3.4 INSTALLATION - DUCTWORK

A. Secure rigid board insulation to duct work with metal fasteners (stick-klip) and scrim washer on 12 inch centers each way. Secure fasteners to duct work with recommended adhesive.

B. Tape duct work insulations joints and penetrations caused by mechanical fasteners with 3 inch wide FSK tape.

C. Ductwork Protective Coating

1. Outdoors: Wrap with aluminum jacketing and secure with bands or screws.

2. Indoors, exposed in mechanical room (heavy abuse areas): Wrap with aluminum jacketing and secure with bands or screws.

3.5 INSULATION SCHEDULE

A. Heating Systems: Use fiberglass pipe insulation.

Service	Nominal Pipe Diameter (inches)	Insulation Thickness (inches)
Steam	Up to 2	1 1/2
(to 15 psi)	2 1/2 to 6	2
	over 6	3 1/2
Steam	Up to 1	2
(above 15 psi to 125 psi)	1 1/4 to 4	2 1/2
	over 4	3 1/2
Condensate	Up to 1 1/2	1 1/2
	2 to 4	2
	over 4	2 1/2
Heating Hot Water (to 200 degrees F)	All sizes	1 1/2

Service	Nominal Pipe Diameter (inches)	Insulation Thickness (inches)
Potable hot water	Up to 2	1
(105 degrees F & greater)	over 2	1 1/2
Non-potable hot water	Up to 2	1
(105 degrees F & greater)	over 2	1 1/2
Refrigerant suction	All sizes	1
Refrigerant discharge	All sizes	1

****
Insulate refrigerant discharge line (hot gas discharge) when there is a danger of personnel coming in contact with piping or when the line is passing through a conditioned space.
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Refrigerant liquid	All sizes	1

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Insulate the refrigerant liquid line when it is passing through spaces having temperatures greater than the refrigerant condensing temperatures.
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NOTE: For piping exposed to outdoor temperature, increase insulation thickness by 1/2 inch.

B. Cooling Systems: Use fiberglass pipe insulation.

Service	Pipe sizes (inches)	Insulation Thickness (inches)
Chilled water (40-55 degrees F)	All sizes	1
Potable water	All sizes	1
Non-potable water	All sizes	1
Tower water	All sizes	1
Roof drain bowl and horizontal rainwater piping	All sizes	1

NOTE: For piping exposed to outdoor temperatures, increase insulation thickness 1/2 inch.

C. Handicapped Lavatory Piping: Use elastomeric pipe insulation:

Service	Pipe Sizes (inches)	Insulation Thickness (inches)
Exposed drain and hot water lines	All sizes	1/2

D. Exhaust Piping: Use hydrous calcium silicate insulation. Wrap with aluminum jacketing.

Service	Insulation Thickness (inches)
Generator Exhaust Piping/Muffler	1 1/2

E. Concealed Ductwork: Use glass fiber (flexible) duct insulation.

Service	Insulation Thickness (inches)
Supply and return air	1 1/2

F. Exposed Rectangular Ductwork: Use glass fiber board (rigid) duct insulation on the exterior of the ductwork.

Service	Insulation Thickness (inches)
Supply and return air	1 1/2

NOTE: Use 2 inch thick insulation for ductwork exposed to outdoor temperatures.

G. Exposed Round Ductwork: Use glass fiber (flexible) duct insulations.

Service	Insulation Thickness (inches)
Supply and return air	1 1/2

NOTE: Use 2 inch thick insulation for ductwork exposed to outdoor temperatures.

END OF SECTION